What is claimed is:

1. A synthesizer circuit for generating complementary sin and cos oscillator signals from an input oscillator signal x(t), said complementary sin and cos oscillator signals being shifting in frequency from said input oscillator signal x(t), said synthesizer circuit comprising:

a divider having an input and generating divided sin and cos outputs based on a signal received at said input;

a first mixer for receiving said input oscillator signal x(t), and mixing said input oscillator signal x(t) with said sin output of said divider to generate an output signal;

a second mixer for receiving said input oscillator signal x(t), and mixing said input oscillator signal x(t) with said cos output of said divider to generate an output signal;

a first removal means for receiving said output signal of said first mixer and removing undesired frequency signals from said output signal, providing said frequency-shifted cos oscillator signal as an output;

the sin output of said first removal means also being connected to the input of said divider; and

a second removal means for receiving said output signal of said second mixer and removing undesired frequency signals from said output signal, thus providing said frequency-shifted sin oscillator signal as an output.

2. The synthesizer circuit of claim 1, wherein said first and second removal means comprise first and second filters.

3. The circuit of claim 2 wherein said first and second filters comprise first and second high pass filters.

4. The circuit of claim 2 wherein said first and second filters comprise first and second notch filters.

5. The circuit of claim 1 wherein said divider comprises a divide-by-n divider.

6. The circuit of claim 5 wherein said divider comprises a divide-by-four divider.

7. The synthesizer circuit of claim 1, wherein said first and second removal means comprise first and second harmonic subtraction circuits.

8. The synthesizer circuit of claim 7, further comprising a polyphase filter for filtering said input signal x(t) prior to feeding said input signal x(t) into said first and second mixers.

9. The synthesizer circuit of claim 7, wherein each of said mixers comprises a harmonic rejection mixer.

10. A demodulation circuit for down-converting an input signal RF, comprising:
a synthesizer circuit as per claim 1, for generating complementary sin and cos oscillator signals, in combination with:
a third mixer for receiving said input signal RF, and mixing said input signal RF with a multi-tonal mixing signal $\varphi 1$, to generate an output signal $\varphi 1$ RF;
a fourth mixer for receiving said signal $\varphi 1$ RF as an input, and mixing said signal $\varphi 1$ RF with a mono-tonal mixing signal $\varphi 2$, to generate an output signal $\varphi 1$ $\varphi 2$ RF;
first and second signal generators for receiving said complementary sin and cos oscillator signals from said synthesizer circuit;
said first signal generator for generating said multi-tonal mixing signal $\varphi 1$; and
said second signal generator for generating said mono-tonal mixing signal $\varphi 2$, where $\varphi 1 * \varphi 2$ has significant power at the frequency of a local oscillator signal being emulated, and neither of said $\varphi 1$ nor said $\varphi 2$ having significant power at the carrier frequency of said input signal RF or said LO signal being emulated.

11. The demodulation circuit of claim 10 wherein said first signal generation circuit includes an exclusive-OR gate (XOR).

12. The demodulation circuit of claim 10 wherein each of said mixers comprises a differential device.

13. The demodulation circuit of claim 10 wherein each of said mixers comprises a harmonic rejection mixer.

14. The demodulation circuit of claim 10 further comprising a polyphase filter.

15. The circuit of claim 10 further comprising a high pass filter electrically connected between said third mixer and said fourth mixer.